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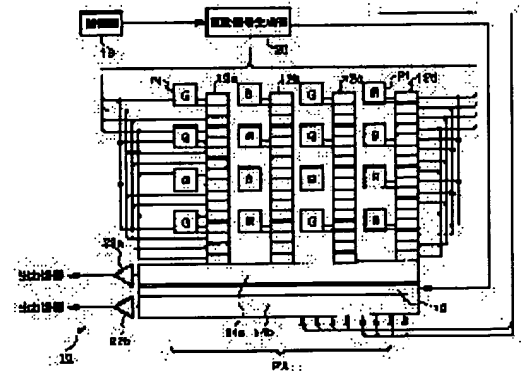
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(54) SOLID-STATE IMAGE PICKUP DEVICE AND ITS DRIVE METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a solid-state image pickup device in which a signal with an output color relation consisting of pixels G, R, B arranged separately from the pixels is obtained from a same output destination at all times without being restricted by an arrangement pattern of color filters.

SOLUTION: In the CCD image pickup device, odd numbered column vertical transfer lines 12a, 12c, even numbered column vertical transfer lines 12b, 12d, an odd numbered row horizontal transfer line 14a and an even numbered row horizontal transfer line 14b, and interlace gates 16 are wired to attain control corresponding to respective components, a control section 18 generates a signal that takes conditions into account, where an output is obtained from a same output destination at all times in a color relation of pixels G, and R, B and an enable drive signal selection section (not shown) in a drive signal generating section 20 uses the generated signal to select a drive signal directly enhancing the conditions and gives the selected signal to each corresponding element, and the signal read by the horizontal transfer lines 14a, 14b is easily outputted from the horizontal transfer lines 14a, 14b in a similar sense to conventional signal read processing in color relations of 'GGGG' and 'RBBR'.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is especially used for a digital still camera, a movie camera, a picture input device, etc. about the solid state camera which outputs the signal which picturized incident light in respect of the image pick-up, and was acquired using two or more perpendicular transfer ways and level transfer ways, and its drive approach, and is suitable.

[0002]

[Description of the Prior Art] In order to obtain a high-definition image, the signal charge which the solid state camera prepared about millions pixel (cel) from hundreds of thousands of pixels, and was obtained by these pixels supplies the signal charge to the level transfer register through a perpendicular transfer register. Improvement in the speed of a level read-out rate is attained, or the device which constituted the level transfer register from two or more lines is used for the solid state camera so that the output signal from a level transfer register may suit the present television specification. There is the so-called Hi-Vision specification as which high-speed processing much more than the present television specification is required as this example. At this specification, a horizontal read-out rate is 74MHz. It is high-speed. In order to control this horizontal read-out rate easily, the configuration for which the solid state camera of this specification uses the level transfer register of two lines is proposed.

[0003] The solid state camera of this specification is 37MHz about the level transfer rate per single tier by distributing the signal charge through which it has passed in a pixel, a perpendicular transfer register, and order to each level transfer register, respectively, and supplying it. It is decreasing. According to this proposal, even if it makes one screen drive with a low level transfer rate, Hi-Vision specification can be satisfied.

[0004]

[Problem(s) to be Solved by the Invention] By the way, degradation arises from this solid state camera to an output signal by using the configuration of the level transfer register of two lines mentioned above. As an example of degradation, degradation arises about 0.01% [the output from the level transfer register by the side of an upper case] from the level transfer register by the side of the lower berth to an output by passing through one step of perpendicular transfer from an upper case to the level transfer register of the lower berth. Moreover, according to two signal read-out, read-out amplifier is also needed, respectively. Since there is a deal of dispersion in the gain of read-out amplifier at this time, it is known that dispersion in the gain of these read-out amplifier will have big effect on the image quality of a screen.

[0005] When the configuration of the level transfer register of two lines, i.e., the level transfer way of two lines, specifically performs signal read-out by monochrome CCD (it is called CCD below Chage Coupled Device:), an upper case side transfer way is CCD. Even lines and a lower-berth side transfer way are CCD. Only odd lines is read. If a screen is constituted using the data outputted through these transfer ways, the difference in brightness can be recognized a little in odd lines and even lines, and it will become the image which the lateral stripe generated as a result. As this cure, signal processing is performed for the acquired signal in the latter part, dispersion in gain is amended, and the image is generated.

[0006] Moreover, CCD corresponding to a color When carrying out image generation, the fixed noise of a lateral stripe will occur in an image similarly with having mentioned above. In case it reads from a transfer way in consideration of this point, the arrangement pattern of a color filter is chosen so that the same color may be read from the same transfer

way. Three primary colors R, and G and B If expressed, in the arrangement pattern of this color filter, it is G. There is a horizontal stripe RB perfect check etc. this arrangement pattern -- responding -- a signal charge -- for example, GGGGG from the transfer way by the side of an upper case ... outputs -- having -- BRBRB from the transfer way by the side of the lower berth ... is outputted. This has mitigated the fixed pattern generated in an image.

[0007] however, the time of the color filter to be used being Bayer -- the arrangement pattern of a color filter -- responding -- a signal charge -- GRGRG from the transfer way by the side of an upper case ... outputs -- having -- BGBGB from the transfer way by the side of the lower berth ... is outputted. In the case of Bayer, for the output of the level transfer way of two lines, a color filter is G. Since it does not become the same color as a result of the relation of the color outputted, and a difference when it is a horizontal stripe RB perfect check, a fixed noise pattern will appear. As for output amplifier, adjustment is also needed for every arrangement pattern in a setup from this difference.

[0008] This invention is Pixel G about the relation of the color which the fault of such a conventional technique is canceled, and it is not restrained by the arrangement pattern of a color filter, but is outputted. The signal separated and packed into Pixels R and B aims at offering the solid state camera always obtained from the same output destination change, and its drive approach.

[0009]

[Means for Solving the Problem] In order that this invention may solve an above-mentioned technical problem, the signal acquired by performing photo electric conversion by the pixel arranged in incident light through the color filter in the image pick-up side is read to the perpendicular transfer way where this pixel was adjoined and continuation formation of two or more components was carried out perpendicularly. This signal is transmitted according to the timing of a driving signal through this perpendicular transfer way. This signal is supplied to the level transfer way where continuation formation of two or more components linked to this perpendicular transfer way and perpendicular was carried out. In the solid state camera which supplies the level transfer way which adjoins this jump means through a jump means to make it jump over this signal, from this this level transfer way, and outputs this signal according to the timing of a driving signal from these level transfer ways While the odd number train of a perpendicular transfer way and the driving signal of every even number train and a level transfer way are supplied every even lines with odd lines of a level transfer way, the driving signal of a perpendicular transfer way When controlling a jump means for every component of a level transfer way, with control of a driving signal generation means to generate the driving signal used for the drive of a perpendicular transfer way, a level transfer way, and a jump means, and this driving signal generation means The activation point control means which performs drive control for every location of the drive timing corresponding to the location where the component of a perpendicular transfer way and the component of a level transfer way are allotted, and a jump means, respectively, It is characterized by including the selection means of operation which chooses actuation of the component of a perpendicular transfer way and a level transfer way and the jump means of storing a signal using the output of this activation point control means and a driving signal generation means, corresponding to a procedure.

[0010] the terminal relation, as for the perpendicular transfer way in a solid state camera, the perpendicular transfer way of a right-hand side terminal and an odd number train is supplied [relation] for the perpendicular transfer way of an even number train to a driving signal from a left-hand side terminal to a level transfer way here to a level transfer way, respectively -- or it is desirable to supply a driving signal to each terminal by the reverse terminal relation. The situation that wiring is [each other] crowded can be made to decentralize by this, and it can contribute also to easy-ization of manufacture.

[0011] While an activation point control means specifies actuation of the even number train of a perpendicular transfer way, and an odd number train While specifying the actuation of even lines and odd lines of a level transfer way as the perpendicular selection-signal generation means which generates the perpendicular actuation selection signal which specifies the number of stages of the perpendicular transfer in a perpendicular transfer way The level selection-signal generation means which generates the level actuation selection signal which specifies the number of stages of the level transfer in a level transfer way, It is advantageous if a jump means includes a jump selection-signal generation means to generate the jump driving signal which makes it jump only over one signal of the locations of the even number train of a perpendicular transfer way, or an odd number train. By this example, the jump driving signal uses the signal in the location of the even number train of a perpendicular transfer way so that between level transfer ways may be made to jump with a jump means. The signal of timing which fulfills required conditions when performing processing summarized in the always same color relation as the signal supplied by the component of a perpendicular transfer way

or a level transfer way and the position control of a jump means by this timing control means comes to be supplied.
[0012] A perpendicular actuation selection means by which a selection means of operation chooses the drive timing in each component of a perpendicular transfer way based on the output of a perpendicular phasing signal generation means and a perpendicular selection-signal generation means, A level phasing signal generation means and a level actuation selection means to choose the drive timing in each component of a level transfer way based on the output of a level selection-signal generation means, It is desirable to include a jump driving signal generation means and a location selection means to choose the location which a jump means makes drive based on the output of a jump selection-signal generation means. In addition to the usual processing which reads by this the signal acquired from this solid state camera, the component to which a driving signal including the conditions always summarized in the same color relation corresponds is supplied. The signal with which this condition shows the transfer procedure of the signal in a solid state camera comes to be acquired.

[0013] As for a selection means of operation, it is desirable to include the means for switching of operation which switches I/O of the component of said level transfer way. Thereby, the migration which returns the signal in a level transfer way to hard flow to the direction of an output side is attained.

[0014] The solid state camera of this invention a perpendicular transfer way, a level transfer way, and a jump means At even number train and an odd number train, Wiring which enables control corresponding to each of odd lines, even lines, and a jump means is performed. The signal in consideration of conditions when outputting from the same level transfer way by the always same color relation outputted beforehand in response is generated by the timing control means. By selection processing generating the driving signal which demonstrates conditions openly using the these-generated signal with a selection means of operation, and supplying it to each corresponding component The conclusion for every signal demanded is easily outputted from a level transfer way with the feeling same with performing the usual signal read-out processing, avoiding the lap of the signal supplied to a level transfer way.

[0015] Moreover, the drive approach of the solid state camera of this invention reads the signal acquired by performing photo electric conversion by the pixel arranged in incident light through the color filter in the image pick-up side to the perpendicular transfer way where this pixel was adjoined and continuation formation of two or more components was carried out perpendicularly. This signal is transmitted according to the timing of a driving signal through this perpendicular transfer way. Two or more components linked to this perpendicular transfer way and perpendicular supply this signal to the 1st level transfer way by which continuation formation was carried out. The 2nd level transfer way which adjoins this jump means through a jump means to make it jump over this signal, from this 1st level transfer way is supplied. In the drive approach of the solid state camera which outputs this signal according to the timing of a driving signal from these level transfer ways While the odd number train of a perpendicular transfer way and the driving signal of every even number train and a level transfer way are supplied every even lines with odd lines of a level transfer way, the driving signal of a perpendicular transfer way When controlling a jump means for every component of said level transfer way, while controlling signal generation at the driving signal generation process which generates the driving signal used for the drive of a perpendicular transfer way, a level transfer way, and a jump means, and this driving signal generation process The activation point control process of performing drive control for every location of the drive timing corresponding to the location where the component of a perpendicular transfer way and the component of a level transfer way are allotted, and a jump means, respectively, It is characterized by including the selection process of operation which chooses actuation of the component of a perpendicular transfer way and a level transfer way and the jump means of storing a signal using the output obtained from this activation point control process, and the output obtained at the driving signal generation process, corresponding to a procedure.

[0016] While an activation point control process specifies actuation of the even number train of a perpendicular transfer way, and an odd number train, here While specifying actuation of the 1st level transfer way and the 2nd level transfer way as the perpendicular selection-signal generation process which generates the perpendicular actuation selection signal which specifies the number of stages of the perpendicular transfer in a perpendicular transfer way The level selection-signal generation process which generates the level actuation selection signal which specifies the number of stages of the level transfer in a level transfer way, It is desirable to include the jump selection-signal generation process that a jump means generates the jump driving signal which makes it jump only over one signal of the locations of the even number train of a perpendicular transfer way or an odd number train. Thereby, the signal used for the usual read-out processing and the signal which performs read-out corresponding to conditions are generated, respectively.

[0017] The perpendicular actuation selection process which chooses the drive timing in each component of a

perpendicular transfer way using the signal with which the selection process of operation was acquired at the driving signal generation process and the perpendicular selection-signal generation process, A driving signal generation process and the level actuation selection process which chooses the drive timing in each component of a level transfer way using the signal acquired at the level selection-signal generation process, It is desirable to include a driving signal generation process and the location selection process which chooses the location which a jump means makes drive using the signal acquired at the jump selection-signal generation process. In addition to the usual processing which reads by this the signal acquired from this solid state camera, the component to which a driving signal including the conditions always summarized in the same color relation corresponds is supplied. The signal with which this condition shows the transfer procedure of the signal in a solid state camera comes to be acquired.

[0018] As an example of a more concrete procedure, a selection process of operation A color filter is G. When it is the arrangement pattern of a vertical stripe RB perfect check, The 1st perpendicular actuation selection process which the perpendicular transfer way which includes the signal of a pixel packed into the 2nd level transfer way after reading the signal acquired by the pixel to each perpendicular transfer way is operated, and supplies this signal to the 1st level transfer way, The location selection process which supplies this signal that the 1st level transfer way includes after this 1st perpendicular actuation selection process to the 2nd level transfer way, The level actuation selection process of moving this signal included after this location selection process on the 1st level transfer way and/or the 2nd level transfer way, and adjusting a horizontal position, The 2nd perpendicular actuation selection process which a perpendicular transfer way including the signal of a pixel packed into the 1st level transfer way is operated, and supplies this signal to the 1st level transfer way is included after this level actuation selection process. It is desirable after this 2nd perpendicular actuation selection process to output this signal with which the processing after the 1st perpendicular actuation selection process was repeated, and color-related was summarized from the 1st level transfer way and the 2nd level transfer way. Thereby, the arrangement pattern of a color filter is G. You can make it output the signal of two lines at a time by the same relation as signal read-out in a horizontal stripe RB check.

[0019] Moreover, when a color filter is the arrangement pattern of Bayer, it is [process / of operation / selection] advantageous in carrying out in order of a level actuation selection process, the 1st perpendicular actuation selection process, a level actuation selection process, a location selection process, the 2nd perpendicular actuation selection process, and a level actuation selection process, after processing from the 1st perpendicular actuation selection process to the 2nd perpendicular actuation selection process. The arrangement pattern of a color filter is G. You can make it output signal read-out of two lines in a horizontal stripe RB check at a time, although a color and the relation of output Rhine are reverse relation, without color relation changing from the same Rhine.

[0020] It is desirable in adjustment of the horizontal position of a level actuation selection process making the forward direction signal migration to the side to which the signal of said 1st level transfer way and said 2nd level transfer way is outputted, and making signal migration to the side and the hard flow this outputted into hard flow, and moving a signal to hard flow at said level actuation selection process, after processing from said 1st perpendicular actuation selection process to said 2nd perpendicular actuation selection process. Thereby, duplication of the signal in the sequence and the location selection process that the signal was supplied, i.e., disappearance of the signal by overwrite, can be prevented.

[0021] The drive approach of the solid state camera of this invention a perpendicular transfer way, a level transfer way, and a jump means An even number train and an odd number train, Wiring which enables control corresponding to each of odd lines, even lines, and a jump means is performed. Two or more signals in consideration of conditions when outputting from the same level transfer way by the always same color relation outputted beforehand in response are generated at a timing signal generation process. By selection processing generating the driving signal which demonstrates conditions openly using the these-generated signal at a selection process of operation, and supplying it to each corresponding component The conclusion for every signal demanded is easily outputted from a level transfer way with the feeling same with performing the usual signal read-out processing, avoiding the lap of the signal supplied to a level transfer way. G G conventionally used even when a vertical stripe RB perfect check or the color filter of Bayer was used It becomes possible to maintain the same color relation and to make it output from the same level transfer way relation [the same output relation as an output or the reverse output relation of a case of a horizontal stripe RB check].

[0022]

[Embodiment of the Invention] Next, with reference to an accompanying drawing, the example of the solid state camera by this invention and its drive approach is explained to a detail.

[0023] The solid state camera of this invention is CCD which outputs the image pick-up signal acquired from each pixel by photo electric conversion, and was especially constituted from a number of pixels of hundreds of thousands - a-1 million number by the charge-coupled device (it is called CCD below Charge Coupled Device:). It uses for a solid state camera and is suitable. This example is such CCD. It explains referring to drawing 1 - drawing 18 about the configuration and its actuation of image pick-up equipment.

[0024] Drawing 1 is CCD. It is the rough mimetic diagram showing the configuration of image pick-up equipment 10. CCD Two or more pixels P_i and 4 perpendicular transfer way 12a-12d allotted to the pixel-field PA of an image pick-up side as shown in image pick-up equipment 10 at drawing 1 Level transfer ways 14a and 14b. It has the jump gate 16, a control section 18, the driving signal generation section 20, and output amplifier 22a and 22b.

[0025] First, perpendicular transfer way 12a-12d mentioned above CCD Level transfer way 14a which has a train caudad in the signal charge (only henceforth a signal) which is the register (or packet) to twist and was obtained by each pixel P_i It goes and transmits. moreover, level transfer ways 14a and 14b it is a register by CCD and perpendicular -- transfer way 12a-12d from -- the signal supplied is transmitted in the direction of a line (or level), and it outputs to output amplifier 22a and 22b. these level transfer ways 14a and 14b **** -- the I/O direction is switched to each register and the driving signal is supplied, respectively so that it may mention later. While each register holds the signal usually transmitted according to the control signal supplied from a control section 18, only the driving signal which moves this signal to an one direction is supplied, but if potential of the signal level of a driving signal is made into the level sequence and the reverse order at the time of the usual drive, it will become possible to move that migration direction in adjustable.

[0026] In the jump gate 16, it is level transfer way 14a. Perpendicular transfer way 12a-12d which can be set It is level transfer way 14b about the signal stored in the corresponding register of a location. The field-effect transistor to transmit is connected to each register. It is made to jump over between level transfer way 14a and 14b by operating the jump gate 16. However, the register of the jump gate 16 is perpendicular transfer way 12a-12d. It is not limited only to a correspondence location and you may prepare across the range of this correspondence location like other examples mentioned later.

[0027] As mentioned above, a control section 18 is also performing direction-of-transfer control of level transfer way 14a and 14b, while supplying a drive control signal to the driving signal generation section 20. They are the even number train control signal ERC and the odd number train control signal ORC so that a perpendicular transfer way may be divided and may be operated in an even number train and an odd number train in this drive control signal. It is. Moreover, it is the even-line control signal ELC so that a level transfer way may be divided into odd lines and even lines and a drive control signal may be operated. Odd-line control signal OLC. It is. A control section 18 is gate G1 control signal G1C - gate G4 control signal G4C which controls each gate drive of the jump gate 16, i.e., ON of operation/OFF. It is outputting to the driving signal generation section 20. usually perpendicular to direction-of-transfer control -- transfer way 12a-12d from -- direction-of-transfer control signal TDC which a control section 18 supplies when making the direction which carries out sequential migration of the signal supplied at the output terminal side of level transfer way 14a and 14b into the forward direction It is the control for which the direction to which you embrace and a signal makes it move is moved to the forward direction or its hard flow. The procedure of such control is good to operate the driving signal generation section 20 according to the program which the control section 18 was made to memorize as a program beforehand for example, and was read.

[0028] In the case of this example, the driving signal generation section 20 is 4 phase driving signal generation section 20a which generates the usual driving signal V1-V4 driven with four phases, i.e., vertical driving signals, horizontal driving signals H1-H4, and the jump driving signals G1-G4. Enabling driving signal generation section 20b which specifies the number of stages of the transfer in a transfer way while specifying actuation of a transfer way It has.

[0029] 4 phase driving signal generation section 20a **** -- vertical driving signal generation section 200a which generates vertical driving signals V1-V4, horizontal driving signal generation section 202a which generates horizontal driving signals H1-H4, and jump driving signal J It has jump driving signal generation section 204a to generate. 4 phase driving signal generation section 20a The signal generated turns into a signal which shows the timing of operation after being enabling. The timing of the signal which each part generates is shown in the latter part. Moreover, horizontal driving signal generation section 202a of the driving signal generation section 20 is making the driving signal with which the electrical potential difference impressed to the electrode (not shown) of each register of level transfer way 14a and 14b according to supply of a direction-of-transfer control signal changed generate.

[0030] enabling driving signal generation section 20b ****, while specifying actuation of perpendicular transfer way 12b of an even number train, perpendicular transfer way 12a of 12 d and an odd number train, and 12c Perpendicular transfer way 12a -12d Perpendicular selection section 200b which generates a perpendicular actuation selection signal as an enable signal which specifies the number of stages which the perpendicular transfer which can be set operates, Level transfer way of odd lines 14a While specifying the actuation of level transfer way 14b of even lines Level transfer way 14a and level selection section 202b which generates the level actuation selection signal which specifies the number of stages (namely, the number of packets which moves) which the level transfer in 14b operates, It has gate selection section 204b to which the jump gate 16 generates the jump driving signal which makes it jump only over one signal of the perpendicular transfer ways of the location of for example, an even number train or an odd number train.

[0031] Here, although not illustrated, they are 4 phase drives and G. Since ***** of a vertical stripe RB perfect check is used, perpendicular selection section 200b is equipped with a total of eight pieces for every four AND (AND) circuits corresponding to the odd number train and the even number train, respectively. The AND circuit of 2 inputs is used for each AND (AND) circuit. Vertical driving signals V1-V4 are supplied to the four end side of an AND circuit at each. Moreover, the even number train control signal is supplied to the other end side of these AND circuits. Similarly, in order to choose actuation of an odd number train, it has four AND circuits and vertical driving signals V1-V4 are supplied also to those end side at each. The odd number train control signal is supplied to the other end side of an AND circuit. The vertical driving signal VE 1 of an odd number train and an even number train - VE4 which show perpendicular transfer authorization (Enable) and its timing of operation by this selection processing It is obtained, respectively (see drawing 1).

[0032] When the number of registers of level transfer way 14a and 14b prepares according to the number of a perpendicular transfer way, level selection section 202b is also equipped with four 2 input AND circuits every [odd lines and] even lines, respectively. Horizontal driving signals H1-H4 are supplied to a total of eight end side of an AND circuit, and four AND-circuit [every] odd-line control signals and even-line control signals are supplied to an other end side. By this selection processing, it is horizontal driving signal HE1 -HE4 of odd lines and even lines. It is obtained, respectively (see drawing 1). Furthermore, as for level selection section 202b, the direction-of-transfer control signal is supplied. Here, processing which makes reverse the inclination of electrical-potential-difference change of horizontal driving signals H1-H4 for the direction-of-transfer control signal to have been supplied from horizontal driving signal generation section 202a by control of an ON state is performed.

[0033] Only when the conditions of both the component (gate) which the jump gate 16 enables, and drive timing are fulfilled by gate selection section 204b, it is equipped with four AND circuits so that jump processing may be made to perform. In the end side of an AND circuit, it is jump timing signal [from jump driving signal generation section 204a] J. It is supplied and gate G1 control signal [which controls the drive of each gate from a control section 18] - gate G4 control signal is supplied to an other end side. By making gate selection by this AND, the location (namely, gate location) of the jump transfer gate 16 is decided.

[0034] It is the vertical driving signal VE 1 - vertical driving signal VE 4 with which perpendicular selection section 200b shows perpendicular transfer authorization (Enable) and its timing of operation. It divides into the perpendicular transfer way of an odd number train and an even number train, and is supplied, respectively. However, in order to avoid the complicatedness of a drawing, only four signal lines express in drawing 2 .

[0035] Similarly, level selection section 202b is horizontal driving signal HE1 -HE4 which shows level transfer authorization (Enable) and its timing of operation. It divides into the level transfer way of odd lines and even lines, and is supplied, respectively. Also in this case, the signal line expresses with drawing 2 only in one half. Moreover, gate selection section 204b is gate driving signal GE1 -GE4. It outputs to the gate (illustration ****) which corresponds, respectively. supply of this driving signal -- level transfer way 14a from -- level transfer way 14b the signal which unlike the former which summarizes a jump and is performed at once is directly under a perpendicular transfer way as shown in drawing 1 -- alternative -- level transfer way 14a from -- level transfer way 14b It can be made to jump now.

[0036] Next, CCD It sets to image pick-up equipment 10, and is G as an arrangement pattern of a color filter. The actuation at the time of using a vertical stripe RB perfect check pattern is explained. Here, since 4 phase drives are performed in this example as mentioned above, especially as for the vertical driving signals V1-V4, phase contrast with an adjoining driving signal has the relation which shifted 90 degrees at a time (see drawing 4). perpendicular in consideration of this -- transfer way 12a -12d setting -- between each pixel -- perpendicular CCD ***** -- four packets are arranged at a time (see drawing 1). It explains referring to the wave form chart of each driving signal and

various kinds of control signals, and the migration condition of an actual signal together with operations sequence. However, the wave form chart of drawing 4 is only what shows the timing of operation, and does not express the information on signal level directly required of a drive, either, while it shows the packet to which it is made to move. CCD Step S10 of the flow chart of drawing 3 which shows operations sequence that image pick-up equipment 10 starts an image pick-up. It progresses.

[0037] step S10 **** -- perpendicular in the signal charge (henceforth a signal) obtained by carrying out photo electric conversion in each pixel -- transfer way 12a -12d. It reads, respectively. The condition of having read this signal is drawing 5 (a). It is shown. After this signal read-out and step S11. It progresses.

[0038] Step S11. It is perpendicular transfer way 12a -12d. They are a part for two steps, 2 [i.e.], packets, and level transfer way 14a about all signals. It is made to transmit to a side. At this time, it is perpendicular transfer way 12a -12d. Since it receives, and an odd number train and an even number train are fair and a perpendicular transfer drive is performed, both the control sections 18 are ON states (namely, level "H") about the even number train control signal and the odd number train control signal. For example, in perpendicular transfer way 12b of an even number train, and 12 d, a vertical driving signal VE 1 - VE4 are CCD. Level transfer way 14a. It receives, is supplied from right-hand side, and, on the other hand, is perpendicular transfer way 12a -12c of an odd number train. It receives and they are a vertical driving signal VE 1 - VE4 from left-hand side. It is supplied. Moreover, since a level drive does not still have the need, it is an OFF state (namely, level "L"). This phase is the time of day t1 shown in drawing 4 . Moreover, the condition in this time is drawing 5 (b). It is shown. Then, step S12. It progresses.

[0039] step S12 **** -- the perpendicular transfer way of an even number train, i.e., perpendicular transfer way 12b, and 12 d -- a part for two packets, and level transfer way 14a. It is made to transmit to a side. A control section 18 makes an odd number train control signal an OFF state in this transfer. By this transfer processing, four packets of signals of perpendicular transfer way 12b and 12 d move until now, and it is level transfer way 14a. It is made to reach by the register (1st perpendicular actuation selection process). This phase is the time of day t2 shown in drawing 4 . Moreover, at this time, it is drawing 6 (a). It is level transfer way 14a so that it may be shown. It turns out that the supplied signal is a signal of the pixels R and B of the pixel bottom. Then, step S13. It progresses.

[0040] Step S13. It is level transfer way 14a. It is level transfer way 14b about a signal. Processing which carries out a jump is performed. This processing is performed by making the jump gate G2 and G4 drive by the driving signal GE2 and GE4 (location selection process). After this processing and step S14. It progresses.

[0041] Step S14. It is level transfer way 14b. A signal is moved to an output amplifier side. Here, level transfer way 14a and 14b have five registers, respectively. The signal located directly under perpendicular transfer way 12b of an even number train and 12 d is arranged by this migration processing directly under perpendicular transfer way 12a of an odd number train, and 12c (level actuation selection process). If it puts in another way, this migration processing is level transfer way 14b. Since it is moving the whole signal, a drive here is horizontal driving signal HE1 -HE4. It will be carried out by the drive of 1 cycle. This 1 cycle drive is level "H" so that an odd-line control signal may be operated between horizontal driving signals H1-H4 like the timing chart of drawing 4 , although not illustrated. When it supplies, it turns out easily that it is obtained. It is drawing 6 (b) about the condition after this level drive. It is shown. In order to make the procedure of each actuation clarify in this example so that this condition may show, it is made not to perform perpendicular transfer processing during this processing period.

[0042] step S15 **** -- a part for the perpendicular transfer way of an odd number train, i.e., perpendicular transfer way 12a, and 12c2 packets, and level transfer way 14a. It is made to transmit to a side. By this perpendicular transfer, the signal of an odd number train is level transfer way 14a. It is made to reach by the register (2nd perpendicular actuation selection process). This phase is the time of day t3 shown in drawing 4 . Moreover, as shown in drawing 7 (a), at this time (T=t3), it is level transfer way 14a. The supplied signal is the pixel G of the pixel bottom. It is a signal. Then, step S16. It progresses.

[0043] Step S16. It is step S12. Processing and same processing are performed. However, the numbers of packets to which it is made to move on the perpendicular transfer way of an even number train are four packets. That is, a part for 1 cycle of the vertical drive by the time of day t4-t5 of drawing 4 will be driven to perpendicular transfer way 12b of an even number train, and 12 d. The signal read from the bottom from the pixel of the 2nd line by this migration processing, i.e., perpendicular transfer way 12b, Pixel B 12d of perpendicular transfer ways Pixel R Level transfer way 14a. It is supplied. It is drawing 7 (b) about the condition after this processing. It is shown. Then, step S17. It progresses.

[0044] step S17 **** -- step S13 the completely same jump processing -- carrying out -- level transfer way 14a the signal of the even number train out of the existing signal -- level transfer way 14b It supplies. thereby -- drawing 8 (a) is shown -- as -- level transfer way 14b **** -- the signal acquired by carrying out photo electric conversion by the pixel of an even number train is allotted to the order corresponding to the direction of a horizontal scanning. After this processing and step S18 It progresses.

[0045] step S18 **** -- the signal with which level transfer way 14a and 14b were obtained in the forward direction by the side of output amplifier 22a and 22b is moved by 1 cycle. By this migration, it is drawing 8 (b). Level transfer way 14a located directly under perpendicular transfer way 12a of an odd number train, and 12c so that it may be shown The register is changed into the condition that there is no signal. After this processing and step S19 It progresses.

[0046] step S19 **** -- when the time of day t5-t6 of drawing 4 makes perpendicular transfer way 12a of an odd number train, and one cycle 12b drive, four packets move -- making -- a signal -- level transfer way 14a It is made to reach. As this processing shows to drawing 9, ** and a diligent **** signal are level transfer way 14a in every perpendicular transfer way 12a and 12c. It is allotted. By this the processing of a series of, it is CCD. Image pick-up equipment 10 is level transfer way 14a in the image pick-up side PA shown in drawing 1. It is Pixel G to level transfer way 14a and 14b in a near pixel, i.e., the lower pixel for two lines, respectively. It can classify and bring together in Pixels B and R. By repeating this processing, the signal within the image pick-up side PA can be made to be able to output, and the same color relation can be maintained and outputted from the same level transfer way in that case. Thus, if coincidence read-out of two lines is performed, generating of a fixed noise pattern can be suppressed.

[0047] By the way, G which is the arrangement pattern of the color filter same as an example of a comparison as this example The case where signal read-out is carried out in the conventional signal read-out procedure to a vertical stripe RB perfect check pattern is explained briefly. CCD shown in drawing 10 Image pick-up equipment 30 is perpendicular transfer way 32a -32d like this invention. It receives, and distinction of even lines and odd lines is perpendicular-transmitted and level transmitted in one according to the ~~vertical driving signals V1-V4 and horizontal driving signals H1-H4~~ which perform neither of the cases but are supplied, respectively to distinction and level transfer way 34a of an ~~even number train and an odd number train~~, and 34b. Moreover, it corresponds to migration of the signal acquired from this one-pixel, and the jump gate 36 is also level transfer way 34a. Level transfer way 24b which bundles up a signal and adjoins It is made to transmit. Drawing 10 is perpendicular transfer way 32a -32d about a pixel to a signal charge. The condition of having read, respectively is shown.

[0048] by 1 cycle, ~~vertical driving signals V1-V4 are shown in drawing 11~~, as a result of making it drive -- as -- level transfer way 34a **** -- a signal is made to reach If a signal shows in the signal from which pixel at this time, ~~corresponding to arrangement of a color filter, "G, R, G, and B" will be obtained from the line of the bottom (see drawing 11 (a)).~~ The jump gate 36 is the driving signal supplied. It drives. then -- if a vertical drive is further performed by 1 cycle -- the same color relation as level transfer way 24a and 24b -- "G, R, G, and B" are obtained (see drawing 11 (b)).

[0049] however, G a horizontal stripe RB check pattern -- like -- color relation -- "G, G, G, G", and "B, R, B and R" -- like -- two level transfer ways of a proper to pixel G The signal of Pixels R and B cannot be separated completely, and it cannot be outputted [can maintain the same color relation and]. If coincidence read-out of the signal for two lines is carried out in this relation, generating a fixed noise pattern is known.

[0050] Thus, by making it constitute and operate, it sets to the conventional solid state camera 30, for example, is G. Each level transfer way obtained when the color filter of a horizontal stripe RB check pattern was used to pixel G The generated fixed noise pattern can be pressed down by separating the signal of Pixels R and B completely, and making the same color relation maintain and output by coincidence 2 line-out. Moreover, it is good to make it control by the driving signal which added the easy circuit for the conventional configuration, stored in the control section the control program which performs changing connection and control of operation, chose the control program of a drive according to the class of color filter, and was generated by this selected program for a drive. Since being able to make it correspond easily and making complicated control perform in signal processing in the latter part by the addition of easy circuitry and a program is lost, it is very effective.

[0051] This CCD Even when the arrangement pattern of the color filter used for image pick-up equipment 10, making it other examples is used as a BEIYA pattern the signal for two lines -- coincidence read-out -- color relation -- "G, G, G, G", and "B, R, B and R" -- like -- always -- the level transfer way of a proper to pixel G It dissociates completely and the signal of Pixels R and B can be outputted. This is explained below. In this explanation, the flow chart of

drawing 12 which shows operations sequence, and the mimetic diagram of drawing 13 - drawing 18 showing the condition by migration of the signal of the image pick-up side PA for every procedure are used together. A control section 18 is G mentioned above, for example. You may enable it to choose a vertical stripe RB perfect check pattern and a BEIYA pattern. When a BEIYA pattern is chosen, it progresses to step S20. this step S20 **** -- the signal charge obtained by the photo electric conversion in each pixel -- each -- perpendicular -- transfer way 12a -12d Read-out processing is performed. This condition is drawing 13 (a). It is shown. Then, step S21 It progresses.

[0052] step S21 **** -- only a part for 1 cycle is made to drive the perpendicular transfer way of an even number train, i.e., perpendicular transfer way 12b, and 12 d By this drive, the signal (it corresponds to Pixel G) of the bottom of perpendicular transfer way 12b and 12 d is level transfer way 14a. It is made to reach (see drawing 13 (b)). After this processing and step S22 It progresses.

[0053] step S22 **** -- level transfer way 14a Level transfer way 14b which adjoins the existing signal using the jump gate 16 It supplies. Level transfer way 14a which stores the signal in the jump gate 16 on the occasion of this supply A driving signal (namely, gate signal) GE2 and GE4 are supplied so that only the signal of a register (or packet) may receive jump processing. By this processing, it is drawing 14 (a). It will be in the condition which shows. However, since the signal is not inputted into other registers at all at this time, all the gates may be made to turn on. After this processing and step S23 It progresses.

[0054] step S23 **** -- the level transfer way of even lines, i.e., level transfer way 14b, It is made to drive. When making the direction of an output amplifier 22a side and the 22b side into the forward direction, it is driving so that a signal may move to this forward direction by three packets (see drawing 14 (b)). In this case, both level transfer way 14a and 14b are equipped with six packets. By this drive, it is level transfer way 14b. A signal is drawing 14 (b). It is transmitted to the packet point of the field which does not have a perpendicular transfer way like (imagination odd number train). After this processing and step S24 It progresses.

[0055] step S24 **** -- only the perpendicular transfer way of an odd number train, i.e., perpendicular transfer way 12a, and 12c are made to drive by 1 cycle Pixel located in the bottom of perpendicular transfer way 12a of this odd number train, and 12c by this drive (R) A signal is level transfer way 12a. It is made to reach. This condition is drawing 15 (a). It is shown. After this processing and step S25 It progresses.

[0056] step S25 **** -- the level transfer way of odd lines, i.e., level transfer way 14a, It is made to drive. At this time, only one packet moves the direction which carries out the level transfer of the signal to hard flow with the forward direction mentioned above (see drawing 15 (b)). this migration -- processing at the following step S26 -- level transfer way 14a Level transfer way in order to avoid the collision with signal supplied 14a from -- it is carried out in order to also secure the sequence of signal read-out at the time of a signal output. This processing can be realized by supplying the signal level accompanied by a reverse order to the sequence of the signal level (not shown) which enables the level drive of the usual forward direction. Step S26 after performing this special level transfer It progresses.

[0057] step S26 **** -- only perpendicular transfer way 12a of an odd number train and 12c are made to drive by 1 cycle, as mentioned above Pixel G located in the 2nd step by this drive from the bottom which adjoins perpendicular transfer way 12a and 12c A signal is level transfer way 14a. It is made to reach (see drawing 16 (a)). After this processing and step S27 It progresses.

[0058] step S27 **** -- level transfer way of odd lines 14a Only one packet makes the forward direction carry out the level drive of the signal (see drawing 16 (b)). By this migration, it sets to level transfer way 14a and 14b so that clearly from drawing 16 a (a), and it is perpendicular transfer way 12a. Pixel [directly under] G which faces A gap arises in the location of a signal. That is, when jump processing mentioned later is performed, the collision of these signals is avoided. After this processing and step S28 It progresses.

[0059] step S28 **** -- level transfer way 14a Existing pixel G Signal S26, i.e., a step, Only the jump gate 16 of the location which shows the signal which was directly under perpendicular transfer way 12a of an odd number train and 12c is made into an ON state. When making it this ON state, it sets to gate selection section 204b, and is the driving signal J from jump driving signal generation section 204a. It is AND of drawing 2 in this case. Circuit 20A - 20D Six included AND The end side of a circuit is supplied. Two of pieces [them] are not illustrated. These six AND The control signal which controls an ON state for every gate is supplied to the other end side of a circuit from the control section 18 in each jump gate 16. the signal which shows an ON state at this time -- AND Circuit 20B Gate driving signal GE2 to output AND which is not illustrated Gate driving signal GE0 which a circuit outputs only -- it is . When these signals are supplied, the jump gate 16 is drawing 16 (b). It is level transfer way 14a so that it may be shown. Pixe

G Only the location of a corresponding signal is turned on. consequently, drawing 17 (a) it is shown -- as -- level transfer way 14b **** -- pixel G as which the spatial location in the inside of the order of read-out of a signal and the line of the adjoining pixel was also considered A signal is packed. It progresses to step S29 after this processing. [0060] step S29 **** -- the signal of the perpendicular transfer way of an even number train, i.e., perpendicular transfer way 12b, and 12 d is moved by one packet. Pixel B read from the bottom to perpendicular transfer way 12 from pixel of 2nd line b, and 12 d by this migration A corresponding signal is level transfer way 14a. It is made to reach. This condition is drawing 17 (b). It is shown. Level transfer way 14b which also mentioned above the signal of these pixels R and B Summarized pixel G The same consideration as a signal is made and it is level transfer way 14a. It is collected After this processing and step S30 It progresses.

[0061] step S30 **** -- the level transfer way of odd lines, i.e., level transfer way 14a, A signal is made to transmit to the forward direction by two packets. By this transfer, it is level transfer way 14a. A signal is level transfer way 14b. Step comes to be kept with the same physical relationship as a signal. Thus, a series of processings are ended by arranging a signal with level transfer way 14a and 14b. Then, although not described in the flow chart of drawing 12, two lines to which the level drive of both level transfer way 14a and the 14b was carried out, and color-related was equal to coincidence are outputted to output amplifier 22a and 22b, respectively. However, the color to output is level transfer way 14a of the example mentioned above. Level transfer way 14b The relation (namely, transfer way which outputs "GGGG" and "RBRB") of the summarized color is reverse. It is clear that signal processing can be carried out, without changing the configuration of signal processing, if connection is switched before carrying out signal processing.

[0062] Thus, it is G of the former ~~color filter~~ by constituting and making the gate of perpendicular transfer way 12a 12d and level transfer way 14a, 14b, and the jump gate 16 drive separately. Other arrangement patterns can supply now the signal of the same pixel as the relation obtained from the arrangement pattern of a horizontal stripe RB check. Thereby, the fixed pattern noise produced with the color filter can be made to cancel.

[0063] In addition, although the procedure of performing perpendicular transfer, level transfer, and every one jump processing one by one to an odd number train, an even number train, ~~even lines, and odd lines~~ explained in the example of this invention in order to easy-ize explanation The spatial location in the inside of the order of read-out of a signal and the line of the adjoining pixel is also taken into consideration, and when the relation which the lap of a signal or a collision does not produce is maintained, a transfer and a jump may be made for the drive of an odd number train, an even number train, even lines, and odd lines to be intermingled in 1 step. By this drive, the time amount which signal read-out takes can be suppressed to the same extent as the conventional drive time amount.

[0064] Moreover, although 4 phase electrode configurations explained signal read-out of a pixel in the example mentioned above, it may not be limited to this electrode configuration and a three-phase-circuit electrode configuration may be used. It is good for there to be no constraint in the class of color filter, i.e., the arrangement pattern of a color filter, and to read to it in consideration of the sequence of the signal to read.

[0065] [Effect of the Invention] According to the solid state camera of this invention, a perpendicular transfer way, a level transfer way, and a jump means Thus, an even number train and an odd number train, Wiring which enables control corresponding to each of odd lines, even lines, and a jump means is performed. The signal in consideration of conditions when outputting from the same level transfer way by the always same color relation outputted beforehand in response is generated by the timing control means. Selection processing generates the driving signal which demonstrates conditions openly using the these-generated signal with a selection means of operation, and it is supplied to each corresponding component. By being easily outputted from a level transfer way with the same feeling as the conclusion for every signal demanded performing the usual signal read-out processing while avoiding the lap of the signal supplied to a level transfer way Holding down design cost, since what is necessary is just to be able to make the easy circuit for the conventional configuration, and control processing add, generating can be suppressed for the pattern of a fixed noise and offer of the high signal of quality can be aimed at.

[0066] The drive approach of the solid state camera of this invention a perpendicular transfer way, a level transfer way, and a jump means Moreover, an even number train and an odd number train, Wiring which enables control corresponding to each of odd lines, even lines, and a jump means is performed. Two or more signals in consideration of conditions when outputting from the same level transfer way by the always same color relation outputted beforehand in response are generated at a timing signal generation process. Selection processing generates the driving signal which

demonstrates conditions openly using the these-generated signal at a selection process of operation, and it is supplied to each corresponding component. By making it output from a level transfer way easily with the same feeling as for the conclusion for every signal demanded to perform the usual signal read-out processing while avoiding the lap of the signal supplied to a level transfer way For example, G Even when a vertical stripe RB perfect check or the color filter of Bayer is used G used conventionally, making full use of the control procedure It becomes possible to maintain the same color relation and to make it output from the same level transfer way relation [the same output relation as an output or the reverse output relation of a case of a horizontal stripe RB check]. Thus, by managing little device addition as much as possible, and performing control processing corresponding to an arrangement pattern, generating can be suppressed for the pattern of a fixed noise and offer of the high signal of quality can be aimed at.

[Translation done.]

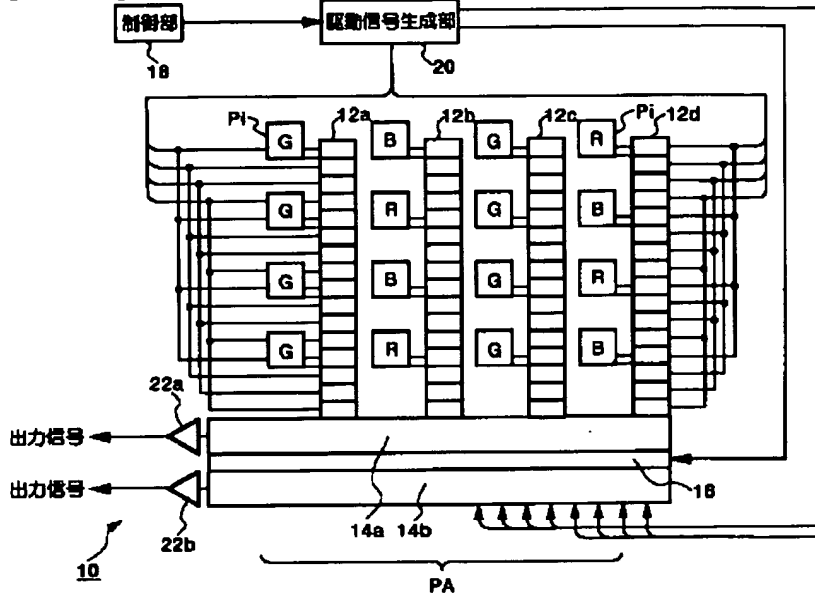
* NOTICES *

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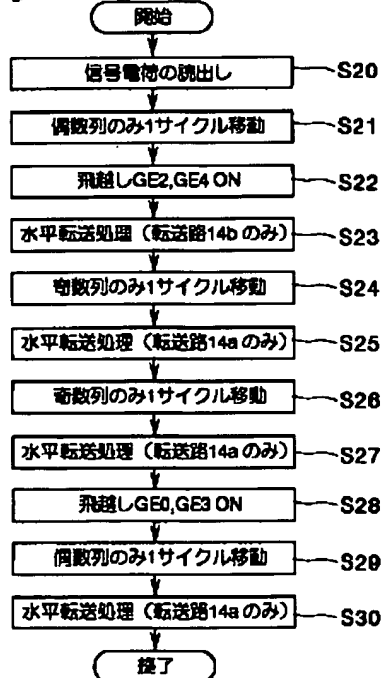
- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DRAWINGS

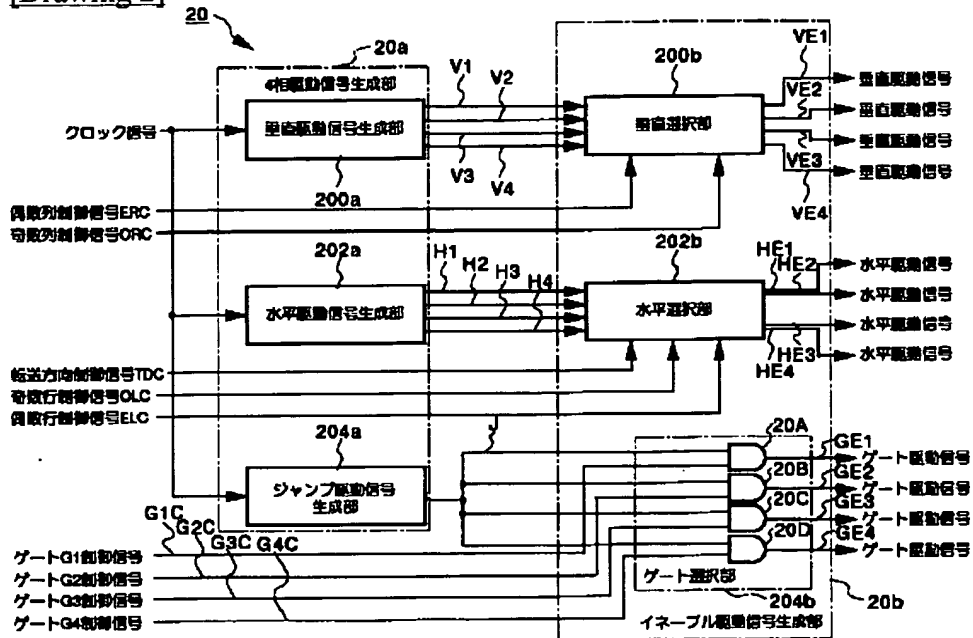
[Drawing 1]



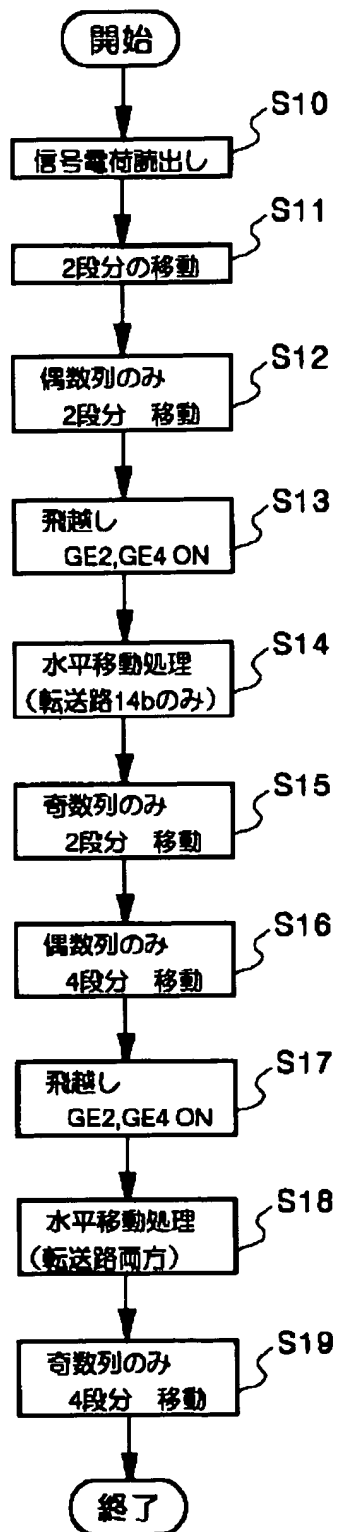
[Drawing 12]



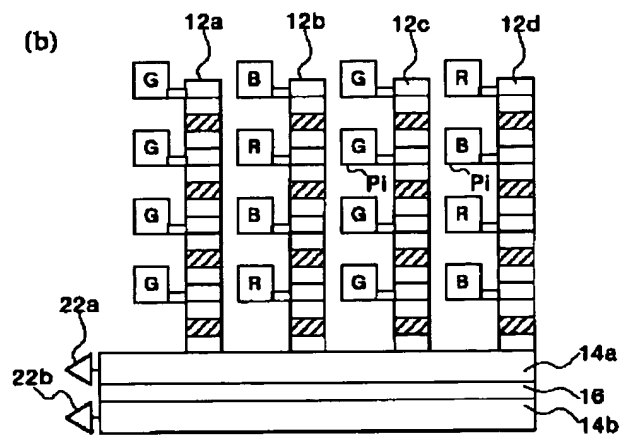
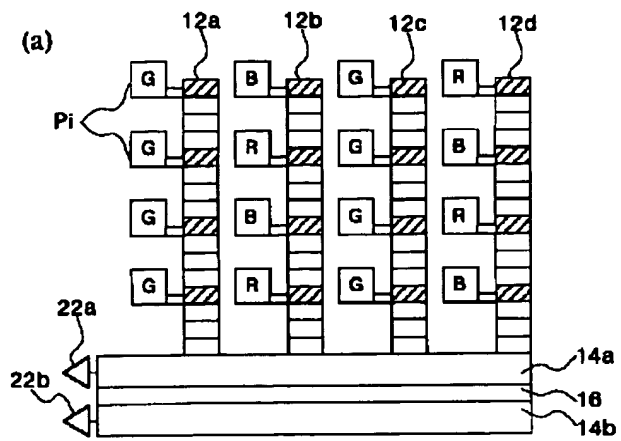
[Drawing 2]



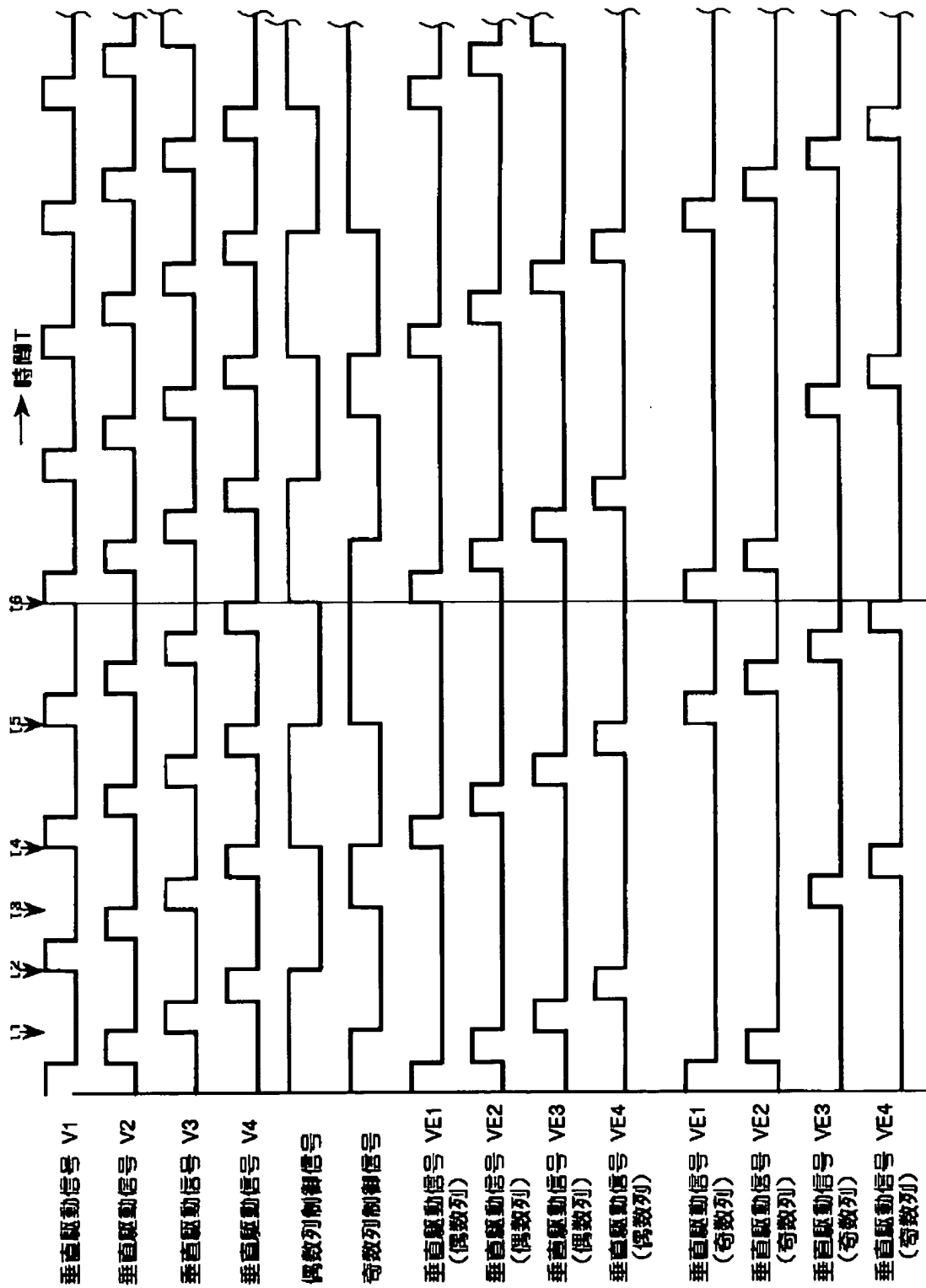
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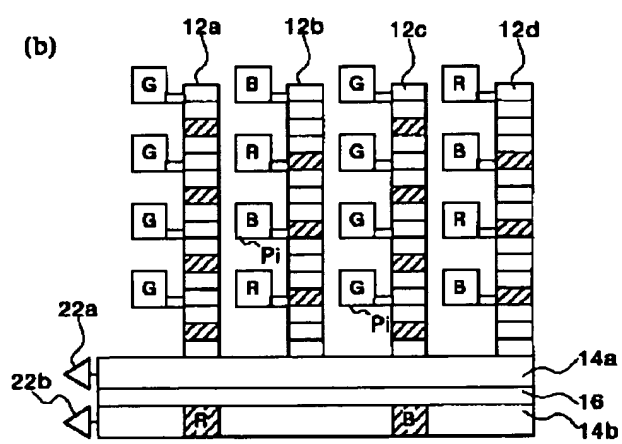
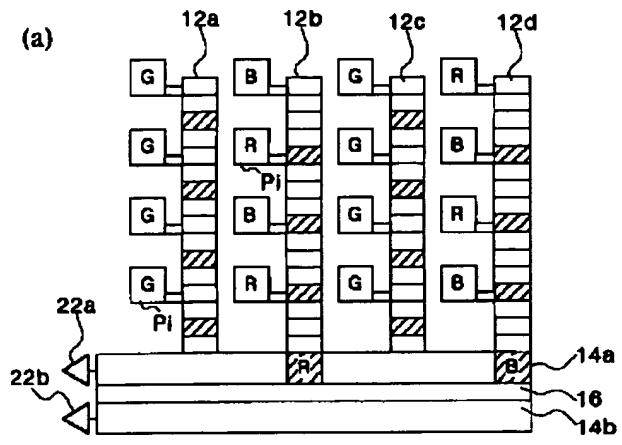
[Drawing 5]



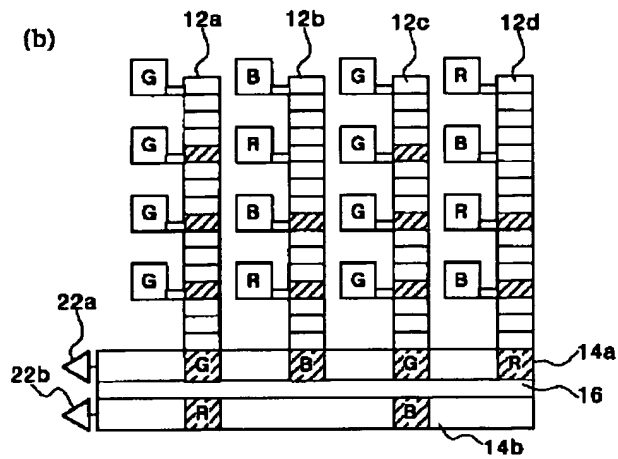
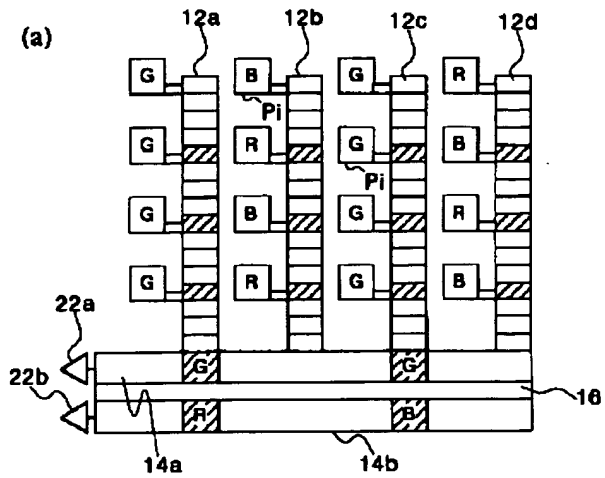
[Drawing 4]



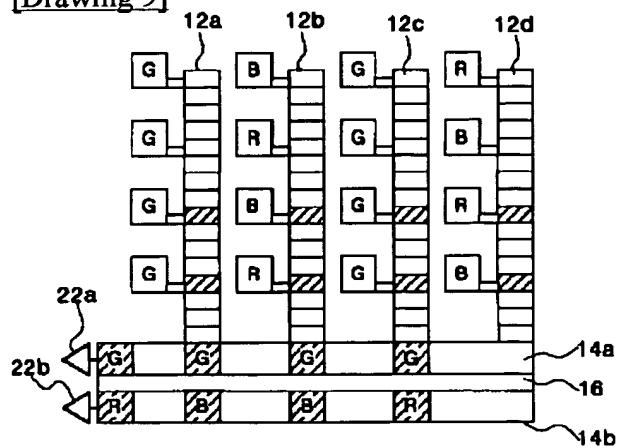
[Drawing 6]



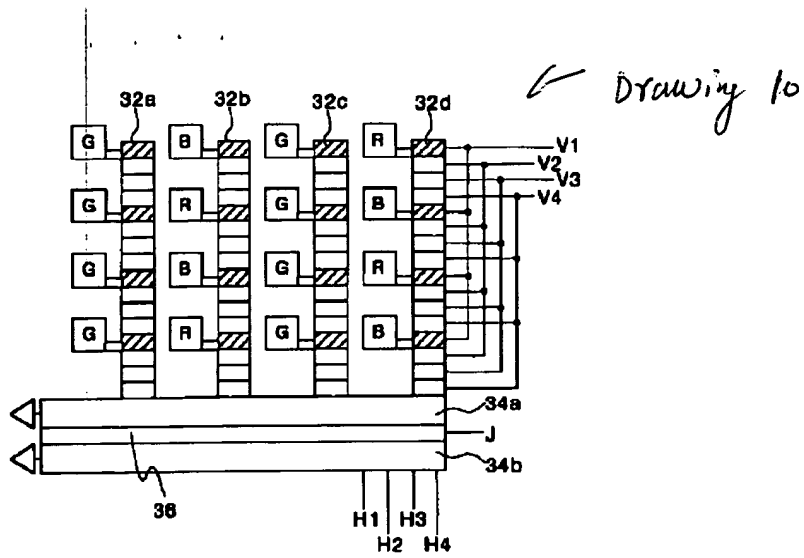
[Drawing 7]



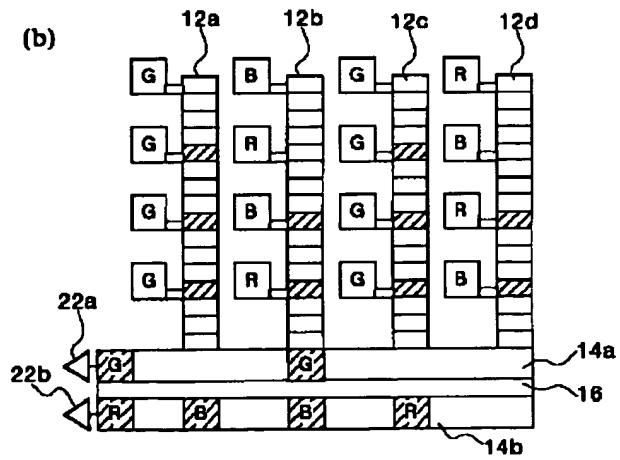
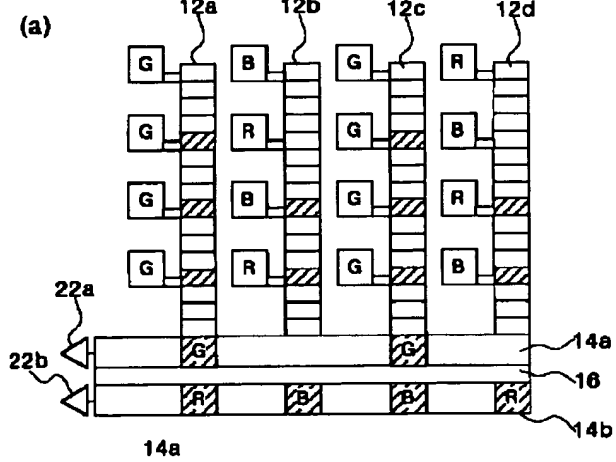
[Drawing 9]



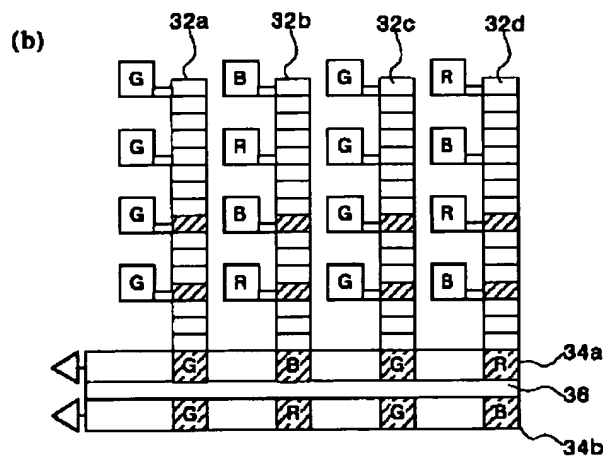
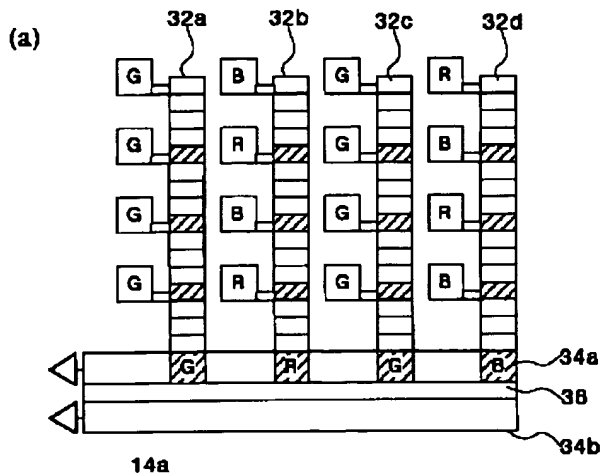
[Drawing 10]



[Drawing 8]

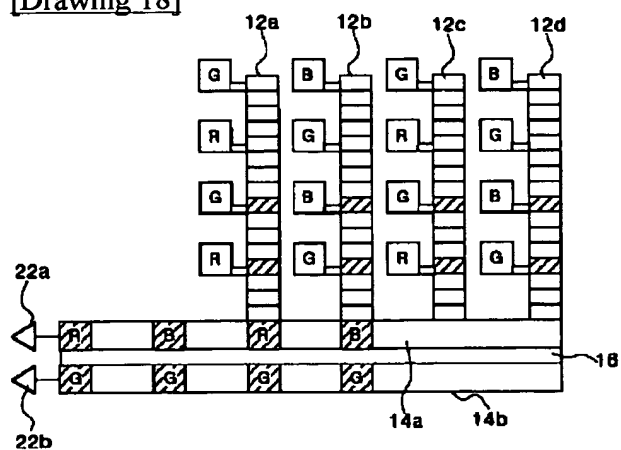


[Drawing 11]

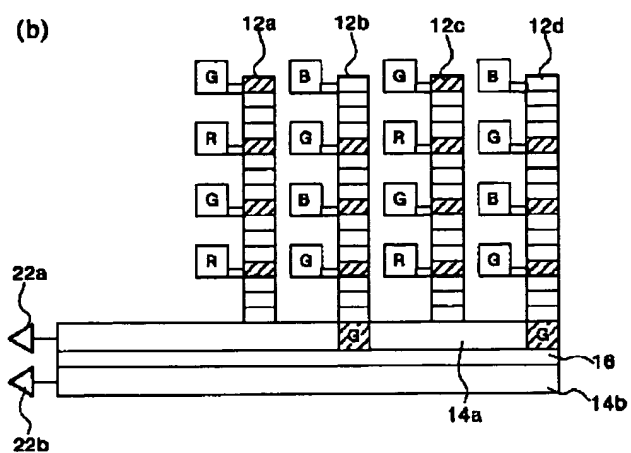
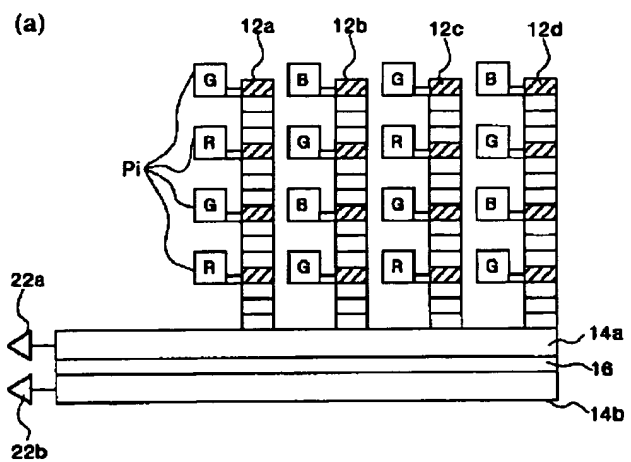


← Drawing 11 (b)

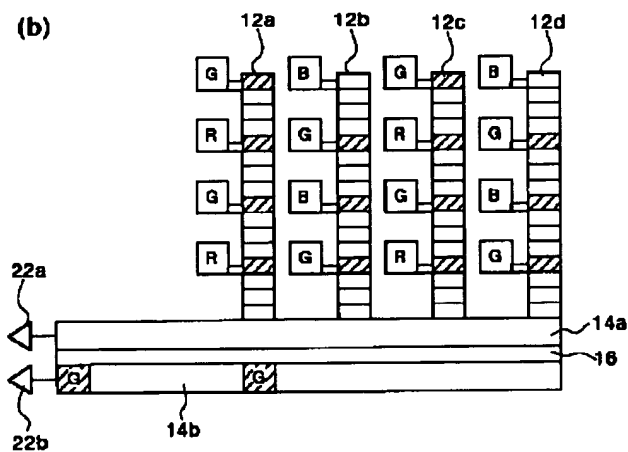
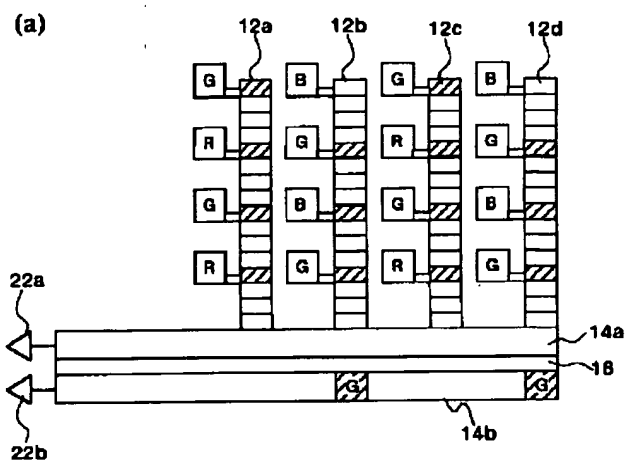
[Drawing 18]



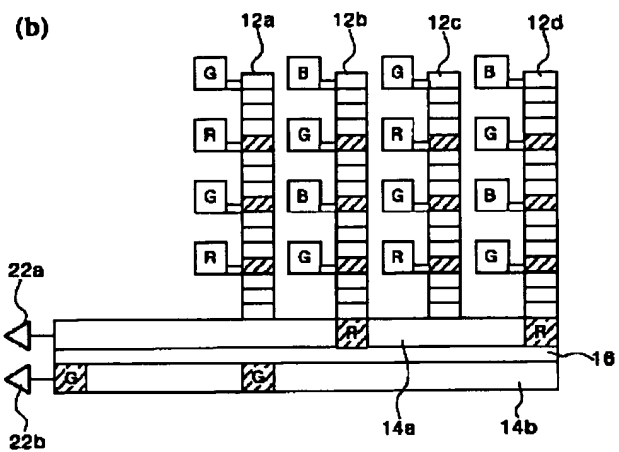
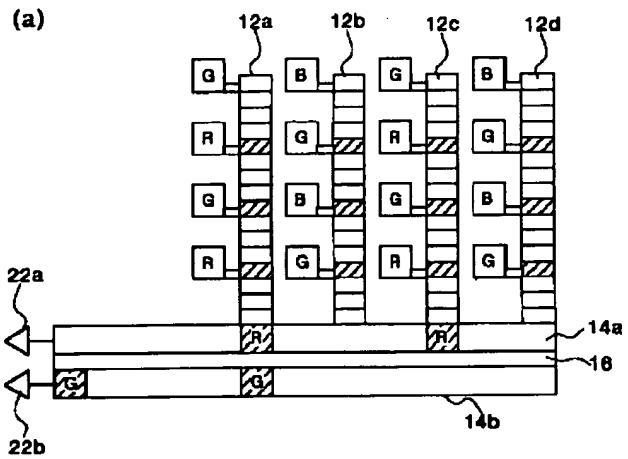
[Drawing 13]



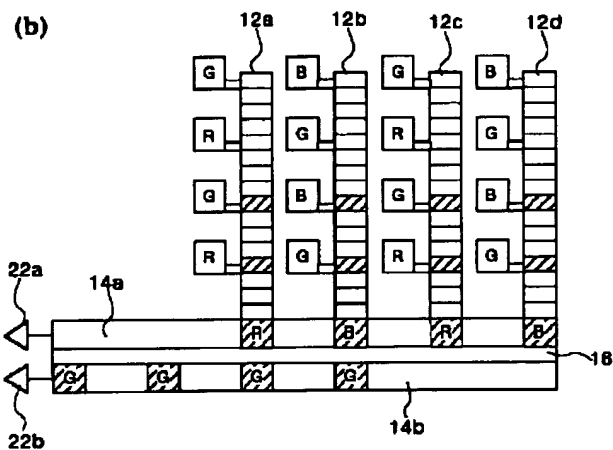
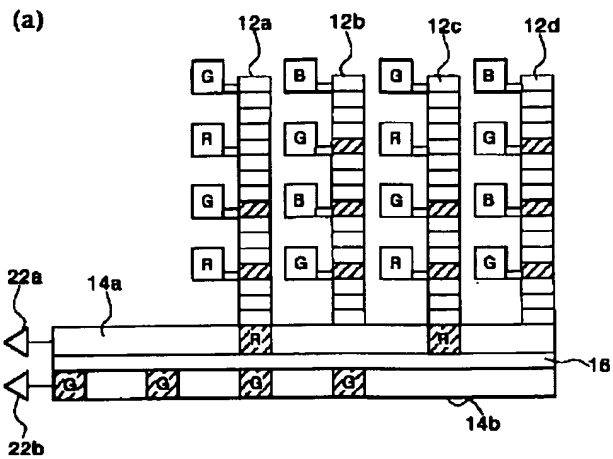
[Drawing 14]



[Drawing 15]



[Drawing 16]



[Translation done.]